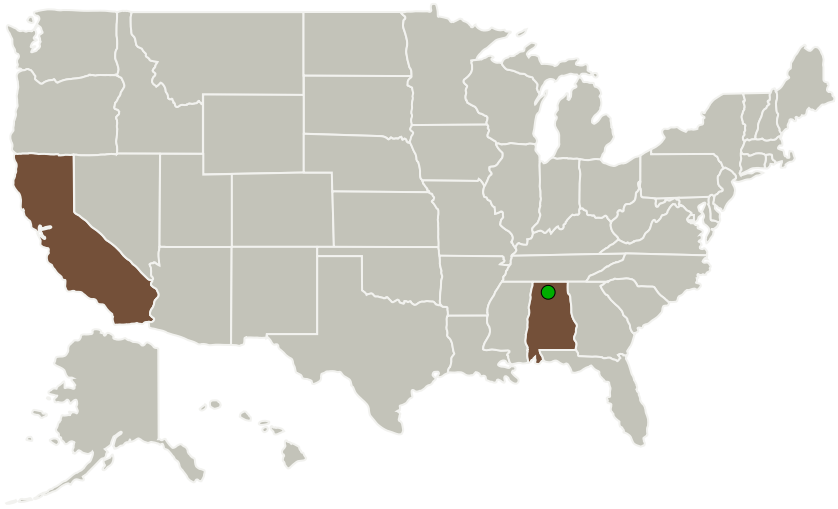
Backpack SEM, Phase I

Completed Technology Project (2011 - 2011)

Project Introduction

The JPL web page devoted to looking for life on Mars has two images. The first is an image of a hydrothermal pool at Yellowstone: the kind of place life might begin. The second is a scanning electron microscope (SEM) image of the Allen Hills 84001 meteorite. This SEM picture is famous for capturing our imaginations when, in 1996, it was thought to show the first pictures of extraterrestrial life. Whether these SEM images represent Martian life forms or something else, they stirred intense scientific research and vigorous debate within the astrobiology community, and increased public interest in the search for life on Mars. When extraterrestrial life is conclusively discovered, it will most likely be shown to the world using an image from an electron microscope. Why have no electron microscopes flown on planetary missions? Because existing SEM's are too large, heavy and fragile to withstand spaceflight. The key to reducing the size and weight of a SEM lies in eliminating the high-vacuum pumping system. In the SEM, every time a new sample is introduced the system must be re-evacuated. The entire pumping system must travel with the SEM. This pumping system is heavy, fragile and consumes a lot of power. It is because of the pumping system that no portable SEM exists, much less one that could travel to Mars. In this proposal, we will eliminate the need for a high-vacuum system in a SEM. This is accomplished by developing a new electron source that can operate in relatively poor vacuum conditions. By eliminating the largest, most complex and heavy part of the SEM, this project will develop a truly portable SEM: the Backpack SEM.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

DLA Instruments

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
DLA Instruments	Lead Organization	Industry	San Jose, California
Marshall Space Flight Center(MSFC)	Supporting Organization	NASA Center	Huntsville, Alabama

Primary U.S. Work Locations	
Alabama	California

Project Transitions

February 2011: Project Start

September 2011: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/138013)*

Project Management

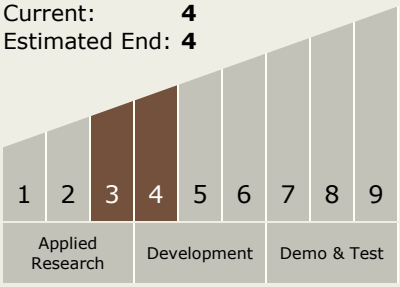
Program Director:
Jason L Kessler

Program Manager:
Carlos Torrez

Principal Investigator:
David Adler

Technology Maturity (TRL)

Start: **3**
Current: **4**
Estimated End: **4**



Technology Areas

Primary:

- TX06 Human Health, Life Support, and Habitation Systems
  - TX06.2 Extravehicular Activity Systems
    - TX06.2.2 Portable Life Support System

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Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System